FIG. 1

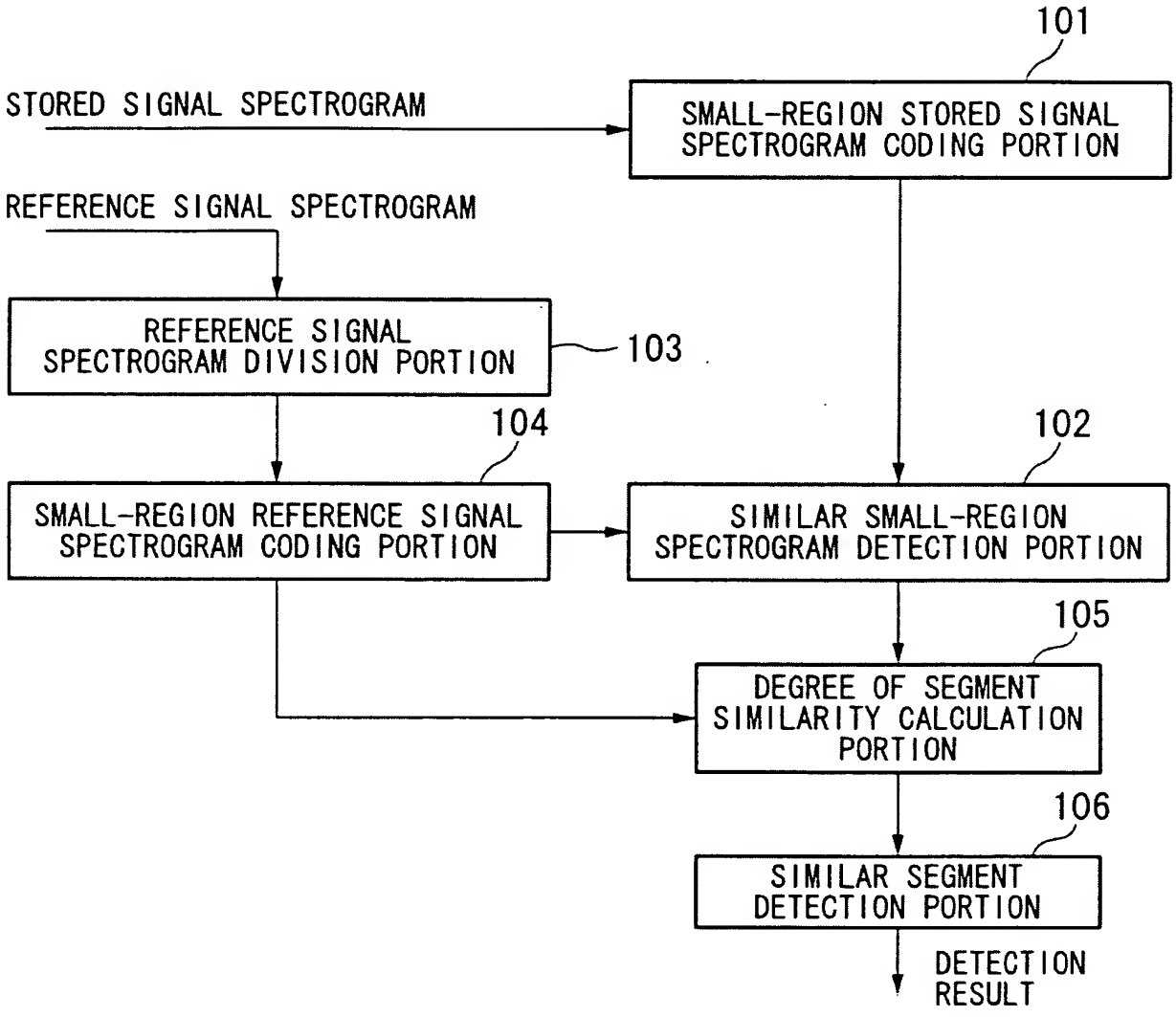

101
STORED SIGNAL SPECTROGRAM
SMALL-REGION STORED SIGNAL SPECTROGRAM CODING PORTION
REFERENCE SIGNAL SPECTROGRAM
REFERENCE SIGNAL SPECTROGRAM DIVISION PORTION
103
104
102
SMALL-REGION REFERENCE SIGNAL SPECTROGRAM CODING PORTION
SIMILAR SMALL-REGION SPECTROGRAM DETECTION PORTION
105
DEGREE OF SEGMENT SIMILARITY CALCULATION PORTION
106
SIMILAR SEGMENT DETECTION PORTION
DETECTION RESULT

FIG. 2

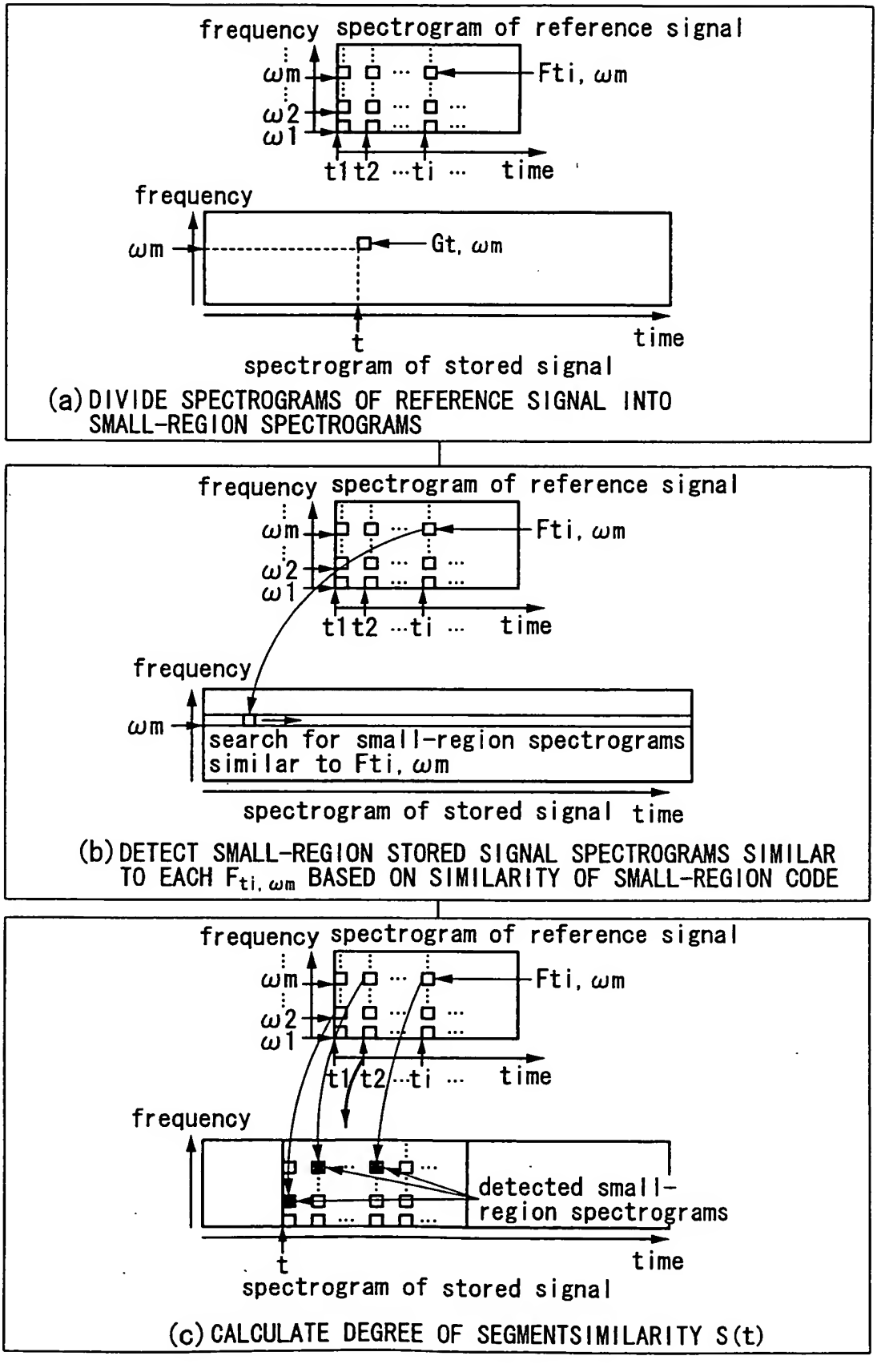

frequency spectrogram of reference signal
ωm
ω2
ω1
Fti, ωm
t1 t2 ···ti ··· time
frequency
ωm
Gt, ωm
t
time
spectrogram of stored signal
(a) DIVIDE SPECTROGRAMS OF REFERENCE SIGNAL INTO SMALL-REGION SPECTROGRAMS
frequency spectrogram of reference signal
ωm
ω2
ω1
Fti, ωm
t1 t2 ···ti ··· time
frequency
ωm
search for small-region spectrograms similar to Fti, ωm
spectrogram of stored signal time
(b) DETECT SMALL-REGION STORED SIGNAL SPECTROGRAMS SIMILAR TO EACH Fti, ωm BASED ON SIMILARITY OF SMALL-REGION CODE
frequency spectrogram of reference signal
ωm
ω2
ω1
Fti, ωm
t1 t2 ···ti ··· time
frequency
detected small-region spectrograms
t
time
spectrogram of stored signal
(c) CALCULATE DEGREE OF SEGMENTSIMILARITY S(t)

FIG. 3

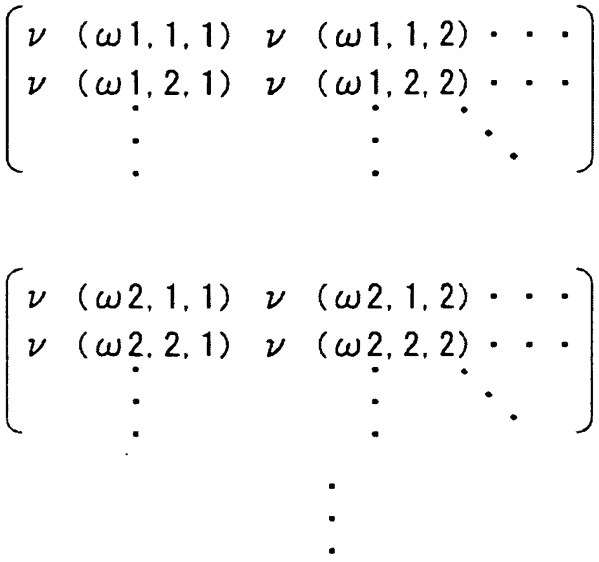

ν (ω1, 1, 1) ν (ω1, 1, 2)
ν (ω1, 2, 1) ν (ω1, 2, 2)
ν (ω2, 1, 1) ν (ω2, 1, 2)
ν (ω2, 2, 1) ν (ω2, 2, 2)

FIG. 4

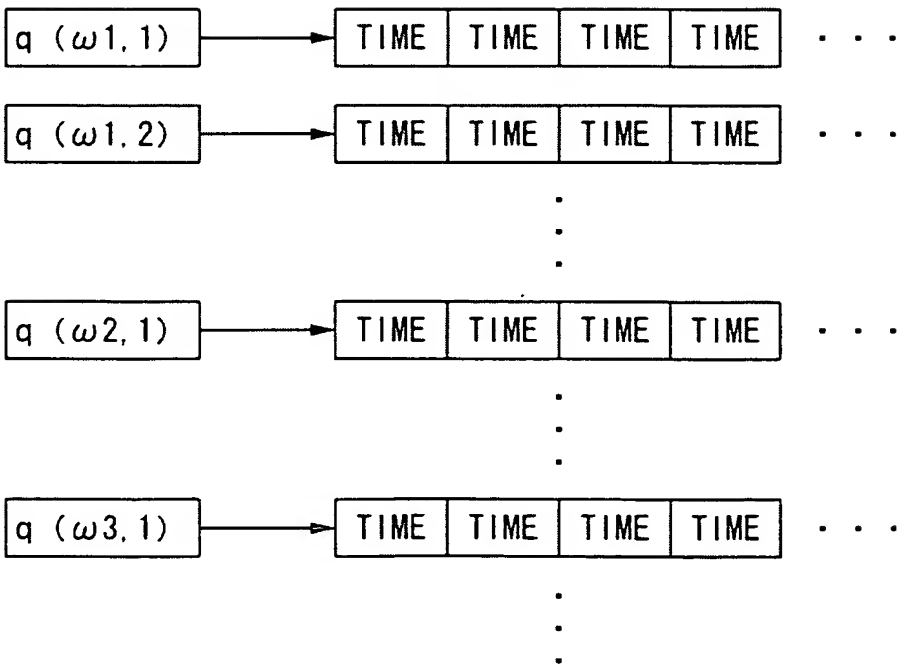

q (ω1, 1)
q (ω1, 2)
q (ω2, 1)
q (ω3, 1)
TIME
TIME
TIME
TIME

FIG. 5

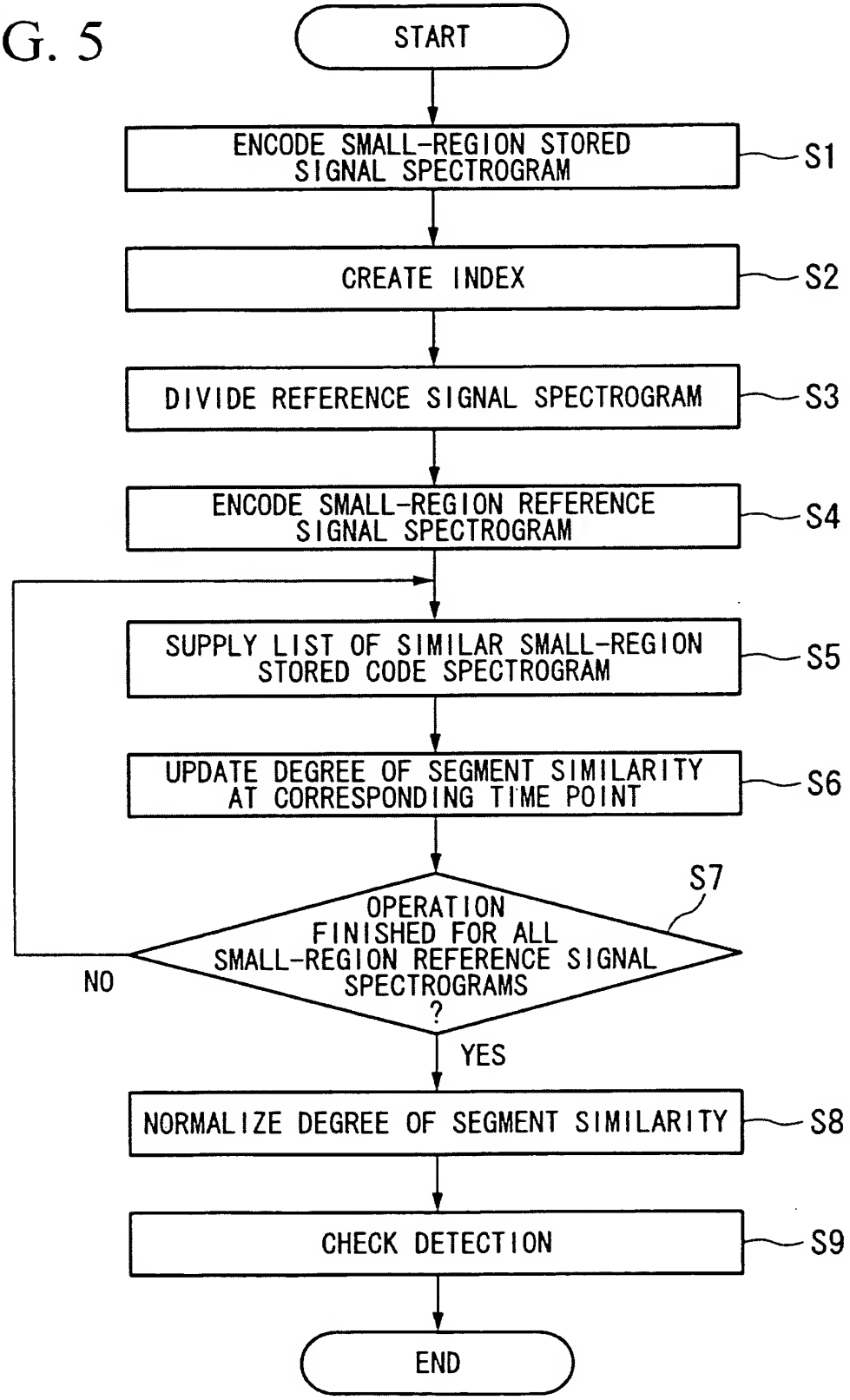

START
ENCODE SMALL-REGION STORED SIGNAL SPECTROGRAM
S1
CREATE INDEX
S2
DIVIDE REFERENCE SIGNAL SPECTROGRAM
S3
ENCODE SMALL-REGION REFERENCE SIGNAL SPECTROGRAM
S4
SUPPLY LIST OF SIMILAR SMALL-REGION STORED CODE SPECTROGRAM
S5
UPDATE DEGREE OF SEGMENT SIMILARITY AT CORRESPONDING TIME POINT
S6
S7
OPERATION FINISHED FOR ALL SMALL-REGION REFERENCE SIGNAL SPECTROGRAMS ?
NO
YES
NORMALIZE DEGREE OF SEGMENT SIMILARITY
S8
CHECK DETECTION
S9
END

FIG. 6

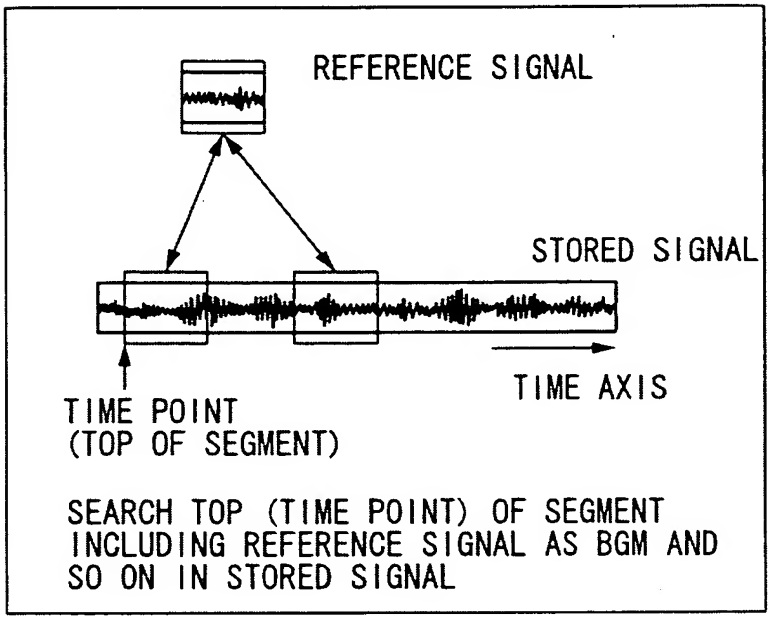

REFERENCE SIGNAL
STORED SIGNAL
TIME AXIS
TIME POINT
(TOP OF SEGMENT)
SEARCH TOP (TIME POINT) OF SEGMENT INCLUDING REFERENCE SIGNAL AS BGM AND SO ON IN STORED SIGNAL

FIG. 7

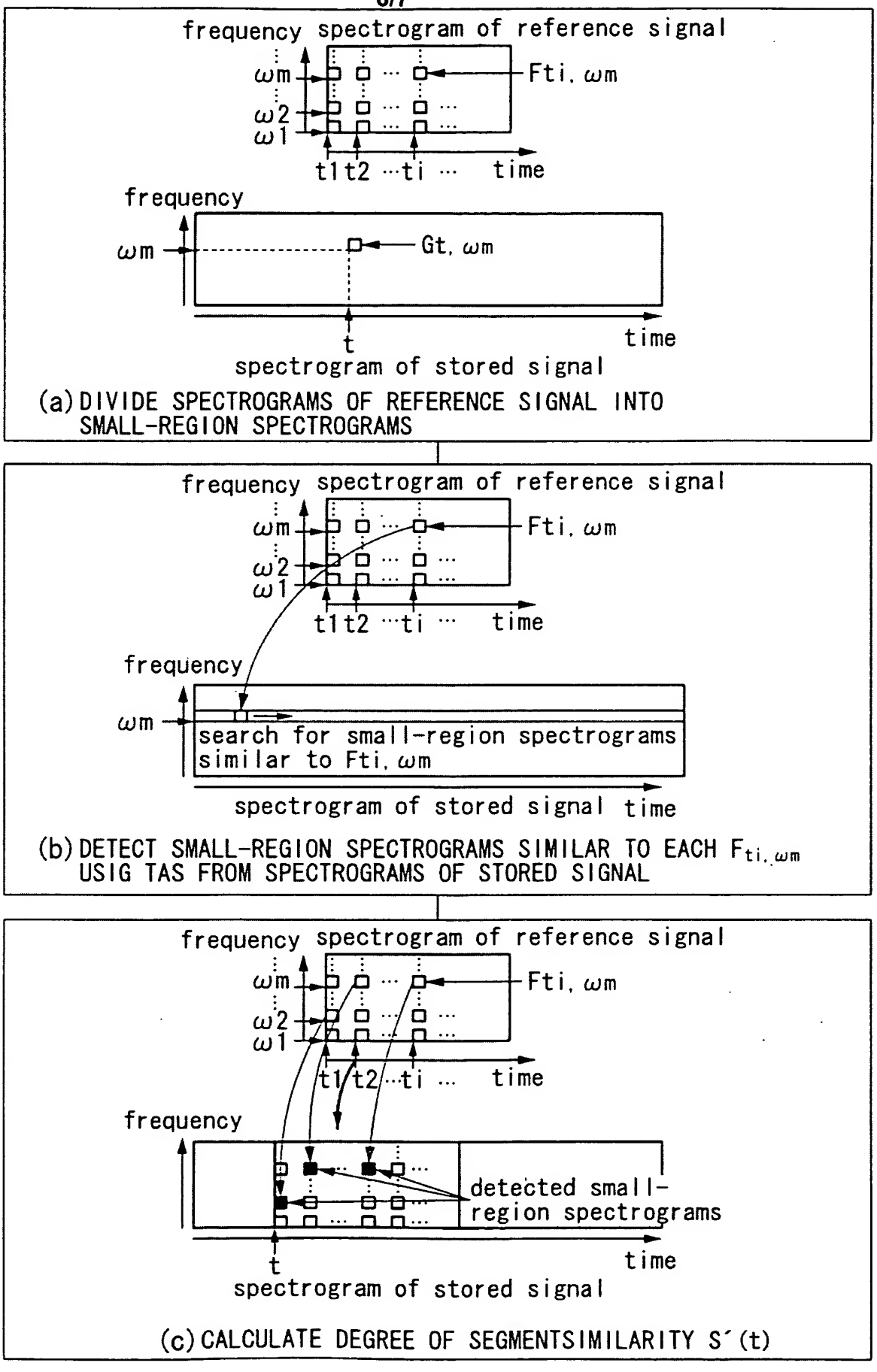
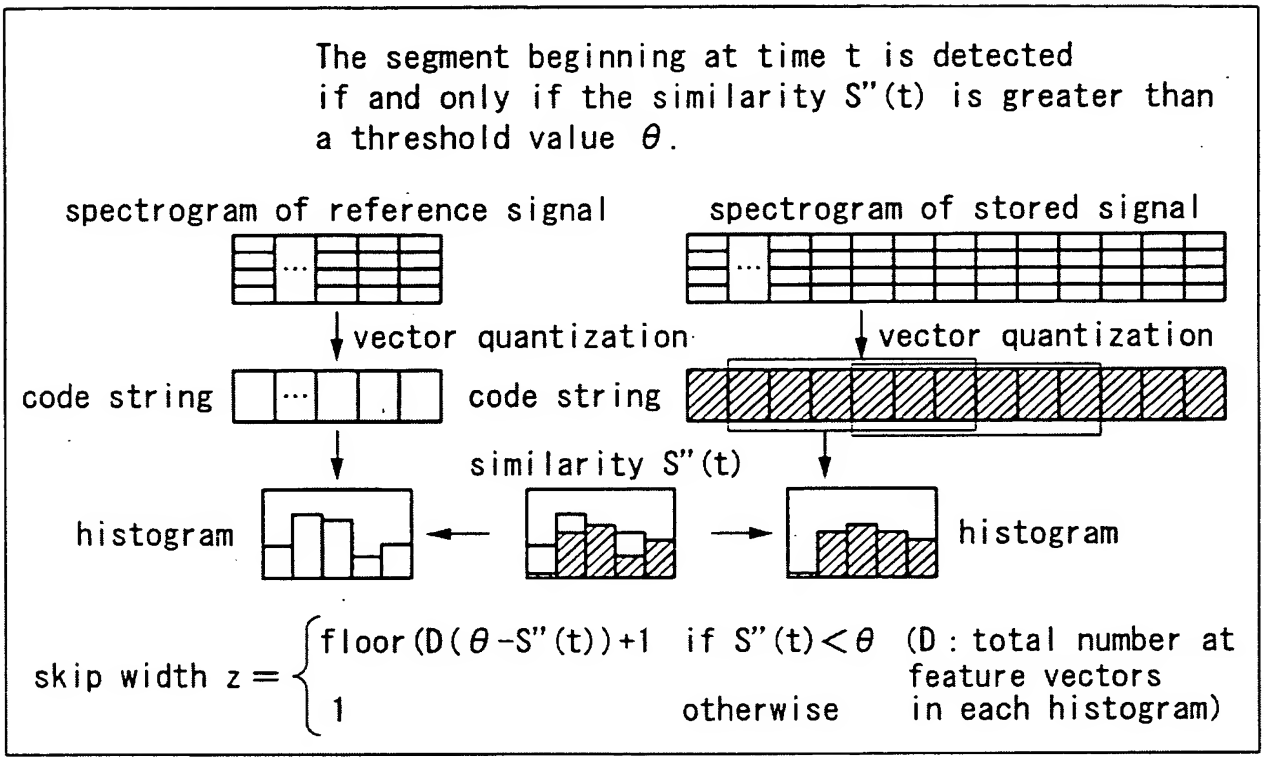

frequency spectrogram of reference signal
ωm
ω2
ω1
Fti, ωm
t1 t2 ··· ti ··· time
frequency
ωm
Gt, ωm
t
time
spectrogram of stored signal
(a) DIVIDE SPECTROGRAMS OF REFERENCE SIGNAL INTO SMALL-REGION SPECTROGRAMS
frequency spectrogram of reference signal
ωm
ω2
ω1
Fti, ωm
t1 t2 ··· ti ··· time
frequency
ωm
search for small-region spectrograms similar to Fti, ωm
spectrogram of stored signal time
(b) DETECT SMALL-REGION SPECTROGRAMS SIMILAR TO EACH Fti, ωm USIG TAS FROM SPECTROGRAMS OF STORED SIGNAL
frequency spectrogram of reference signal
ωm
ω2
ω1
Fti, ωm
t1 t2 ··· ti ··· time
frequency
detected small-region spectrograms
t
time
spectrogram of stored signal
(c) CALCULATE DEGREE OF SEGMENTSIMILARITY S´(t)

FIG. 8


The segment beginning at time t is detected if and only if the similarity S"(t) is greater than a threshold value θ.
spectrogram of reference signal
spectrogram of stored signal
vector quantization
vector quantization
code string
code string
similarity S"(t)
histogram
histogram
skip width z = floor(D(θ-S"(t))+1 if S"(t)<θ (D : total number at feature vectors in each histogram)
1 otherwise